

Designing tax policy in federalist economies: An overview

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Abstract

The emerging economic federations of the European Union, Russia, and South Africa, along with the established federations in Australia, Canada, and the United States, confront the task of designing the institutions for federal fiscal policy. This paper reviews the literature on the design of tax policy in federalist economies. We conclude that taxation by lower level governments can lead to significant economic inefficiencies and inequities. The usual ‘assignment’ view of federalism recommends central government policies – for example, resident-based taxation or grants-in-aid – to correct these failures. These recommendations assume that the central government will act as a benevolent social planner. The ‘political economy’ view of federalism suggests that this assumption is in error and that additional federalist institutions must be considered. Alternative legislative structures and constitutional rules are considered.

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1. Introduction

Current constitutional efforts to construct a new Russian federation, the emergence of a more open and economically integrated Europe through the

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European Union, the drafting of a democratic constitution for South Africa, and more generally, a widespread disaffection with central government policy-making as ‘the’ solution to all economic inefficiencies and inequities, raise anew a longstanding question in public finance: How do we allocate responsibilities for economic policy among alternative levels of government? An important component of this federalist research agenda, and the focus of this review, is the allocation of taxing powers among the various levels of government.

Section 2 organizes, and hopefully clarifies, the new theoretical and empirical results on the design of tax systems for federalist public economies. When read separately, the many papers in this literature may seem to give conflicting advice. When taken together, however, the studies offer a consistent agenda for the design of a welfare-maximizing tax policy. Whether this agenda becomes social policy is another question, however. Section 3 argues that in one plausible model of democratic decision-making the efficient tax structure of Section 2 will be difficult to sustain. This important result extends the research agenda for the design of tax policy in federalist public economies. In addition to the design of tax policy, one must also consider the design of political institutions to implement the policy agenda. We suggest informal legislative structures using strong political parties and executive veto powers and formal constitutional rules assigning taxes and setting the number of states in the federation as possible institutional reforms. Section 4 provides a concluding comment.

2. Tax assignment in federalist economies: the economic arguments

In an elegant paper entitled ‘An optimal taxation approach to fiscal federalism’, Gordon (1983) clarifies what is required for the efficient and equitable performance of taxation in a two-tier – local and central – federalist public economy. His analysis, and our extensions of his model here to a richer political economic specification, provide the conceptual framework – the ‘skeleton’ – for organizing the body of the new theoretical and empirical literature on taxation in federalist economies.

2.1. Coordinated and decentralized tax policies

In the Gordon analysis, the federalist public economy consists of K non-overlapping ‘state’ jurisdictions and one central government. Residents reside in only one state, but they may purchase final goods and services and

sell their factor inputs anywhere in the national economy.¹ Each citizen i owns factor inputs, denoted individually as x_{fk}^{il} for the amount of the f th factor sold in the k th state by the i th person residing in the l th state.² Factor f receives a pre-tax return of v_{fk} depending upon the state in which it is employed. Each citizen i buys goods and services, denoted as y_{jk}^{il} for the j th good bought in the k th state by the i th person residing in the l th state. Good or service j sells for a pre-tax price of p_{jk} depending on the state in which it is purchased.

State governments and the central government also hire factor inputs to produce public goods and services. The factor inputs are denoted b_{fk} for the aggregate amount of the f th factor hired by the k th state government. For simplicity, only state governments produce public goods. The central government could produce a public good in this model; it would do so within the boundaries of one or more of the states using the inputs b_{fk} . Since our focus is on the design of tax policy in federalist economies, we shall assume that each b_{fk} – and thus the level of public facilities – is exogenously given in each state.³

State k meets its revenue needs to finance its expenditures on factor inputs – $R_k = \sum_f b_{fk} \cdot v_{fk}$ – by using taxes on factors and on goods and services. State taxes may be resident-based or source-based. *Resident-based* taxes (also known as *destination-based* taxes) tax factors based on the owners' residence and tax goods and services by the consumers' residence. *Source-based* taxes (also known as *origin-based* taxes) tax factors where they are employed and tax goods and services where they are purchased. Source-based taxes are typically easier to administer and, for this reason, are often the more common form of lower government taxation. We shall consider, initially, the design of state taxation assuming source-based taxation only.⁴

Source-based state tax rates on factors are per-unit taxes levied at the uniform rate t_{fk} on factor f employed in state k . Factors of production therefore earn an after-tax return or wage of $w_{fk} = v_{fk} - t_{fk}$. Consumers of goods and services in state k pay a per-unit tax s_{jk} and face after-tax prices $q_{jk} = p_{jk} + s_{jk}$. Total tax revenues in state k will be

¹ 'States', as presented here, can be viewed as US states, Canadian provinces, German lander, European nations in the new European Union, the participating provinces and republics of the new Russian federation, or the provinces in the new Republic of South Africa. The analysis can be extended to a three-tier federalist economy.

² The notation is admittedly burdensome and we have tried whenever possible to match that used by Gordon (1983).

³ This restrictive assumption precludes a feedback from tax policy to spending policy. Other studies of competitive tax policy have studied this interaction specifically; see footnote 7.

⁴ Subsection 2.3 comments on how the results change with resident-based taxation.

$$T_k = \sum_f x_{fk}^{**} \cdot t_{fk} + \sum_j y_{jk}^{**} \cdot s_{jk} + \sum_f b_{fk} \cdot t_{fk}.$$

The first asterisk represents the aggregation over all i persons residing in state l and the second asterisk represents the aggregation over all l states; thus, x_{fk}^{**} is the national use of factor f in state k . Similarly, y_{jk}^{**} is the national consumption of good j in state k . Note also that factors used in the public sector are taxed. Importantly, with source-based taxation, non-resident factor incomes and non-resident consumption can be taxed. State k is required to balance its budget. Thus, $R_k = T_k$, or

$$\sum_f b_{fk} \cdot v_{fk} = \sum_f x_{fk}^{**} \cdot t_{fk} + \sum_j y_{jk}^{**} \cdot s_{jk} + \sum_f b_{fk} \cdot t_{fk},$$

or

$$\sum_f x_{fk}^{**} \cdot t_{fk} + \sum_j y_{jk}^{**} \cdot s_{jk} - \sum_f b_{fk} \cdot w_{fk} \equiv 0.$$

The social policy objective is to select the levels of each tax instrument in each state, t_{fk} and s_{jk} , so as to maximize society's aggregate social welfare function defined as

$$W = \sum_i \omega^i \sum_k n^{ik} V^{ik} \{q_{**}, w_{**}, c^k(q_{**}, w_{**}); E^{ik}, b_{*k}\}, \tag{1}$$

where ω^i is the social welfare weight for people of type i , n^{ik} is the number of people of type i living in state k , and $V^{ik}(\cdot)$ is the indirect utility of the i th person in the k th state. Utility in turn depends upon the vectors of after-tax prices for commodities (q_{**}) and factors (w_{**}), a congestion parameter c^k unique to state k , which itself depends upon prices (since prices determine the location of residents and factors), and exogenous factor endowments (E^{ik}) and the vector of exogenous public sector facilities (b_{*k}) provided in state k .

The chosen tax rates must be sufficient to pay for the exogenously given public sector factor inputs, specified by the aggregate budget constraint:

$$\sum_k \left[\sum_f x_{fk}^{**} \cdot t_{fk} + \sum_j y_{jk}^{**} \cdot s_{jk} - \sum_f b_{fk} \cdot w_{fk} \right] \equiv 0. \tag{2}$$

This specification of the budget constraint allows for cross-state redistribution of tax revenues; excessive revenues can be raised in one state to cover shortfalls in another via centrally administered grants-in-aid.

The central planner's policy instruments are the tax rates t_{fk} and s_{jk} , some of which may be less than zero if grants exceed taxation. The rates t_{fk} and s_{jk} are chosen to maximize Eq. (1) subject to the revenue constraint in Eq. (2). Table 1 summarizes the first-order conditions which must be satisfied if the central planner is to maximize social welfare; Gordon (1983, appendix)

Table 1
Taxation of outputs and inputs in a federalist economy

Direct (1)	Distribution (2)	Congestion (3)	Tax Revenue (4)	Public costs (5)	Terms of trade (6)
<i>Centralized planning</i>					
For $\tau_{jl} = s_{jl}$ For $\tau_{jl} = t_{jl}$	$ \left. \begin{array}{l} (\mu - \theta)y_{jl}^{**} \\ (\mu - \theta)x_{jl}^{**} \end{array} \right\} + \sum_k \sum_i \left\{ d\theta^{ik} \frac{\partial I^{ik}}{\partial \tau_{jl}} \right\} + \sum_k \frac{\partial C^k}{\partial \tau_{jl}} + \mu \sum_k \frac{\partial T^k}{\partial \tau_{jl}} - \mu \sum_k \frac{\partial R^k}{\partial \tau_{jl}} + \theta \sum_k \frac{\partial \Pi^k}{\partial \tau_{jl}} = 0 $				
<i>Decentralized competition</i>					
For $\tau_{jl} = s_{jl}$ For $\tau_{jl} = t_{jl}^{**}$	$ \left. \begin{array}{l} \{\mu^l - \theta^l (\sum_{i \in P} n^{il} y_{jl}^{il} / y_{jl}^{**})\} y_{jl}^{**} \\ \{\mu^l - \theta^l (\sum_{i \in P} n^{il} x_{jl}^{il} / x_{jl}^{**})\} x_{jl}^{**} \end{array} \right\} + \sum_{i \in P} \left\{ d\theta^{il} \frac{\partial I^{il}}{\partial \tau_{jl}} \right\} + \frac{\partial C^l}{\partial \tau_{jl}} + \mu^l \frac{\partial T^l}{\partial \tau_{jl}} - \mu^l \frac{\partial R^l}{\partial \tau_{jl}} + \theta^l \frac{\partial \Pi^l}{\partial \tau_{jl}} = 0 $				

presents the derivation. There are six distinct effects on social welfare because of changes in state tax rates.

Term (1) *The Direct Revenue Effect*: Small changes in either the per-unit state tax rate on consumption – denoted by the rate $\tau_{jl} = s_{jl}$ – or the per-unit state tax rate on a factor – denoted by the rate $\tau_{jl} = t_{jl}$ – will raise revenues of y_{jl}^{**} and x_{jl}^{**} , respectively, in state l and improve social welfare by $(\mu - \theta)y_{jl}^{**}$ and by $(\mu - \theta)x_{jl}^{**}$, respectively. The additional revenue of y_{jl}^{**} and x_{jl}^{**} creates a social marginal benefit of μ dollars when allocated to the public sector and imposes a social marginal burden of θ when taken from the private economy.⁵ When social marginal benefits exceed social marginal costs ($\mu > \theta$), then increasing a state tax rate adds to social welfare.

Term (2) *The Distributional Effect*: Changes in state taxes may change factor and commodity prices throughout the economy and thus the real incomes (I^{ik}) of citizens. The resulting changes in income are weighted by $d\theta^{ik}$, the difference between the social marginal utility of a private dollar given to each citizen and the social value of that dollar when given to the economy's ‘average’ citizen: $d\theta^{ik} = \omega^i \alpha^{ik} - \theta$, where ω^i is the social welfare weight for people of type i , α^{ik} is the private marginal utility of income for

⁵ Formally, μ is the value of the Lagrange multiplier for the aggregate revenue constraint in Eq. (2); μ measures the gain in social welfare when an additional dollar of public revenues are raised. Formally, $\theta = \sum_k \sum_i [(n^{ik} \omega^i \alpha^{ik} / N)]$, where α^{ik} is the private marginal utility of income for the i th person in the k th state and N is the total population in all states; θ can be interpreted as the socially weighted value of a dollar to the average citizen in the entire economy when that dollar remains in the private economy for the consumption of goods and services.

the i th person in the k th state, and θ is the social value of that dollar given to the average citizen in society. For lower income households and households in more congested states, $d\theta^{ik} > 0$ is likely, while for upper income households and households in less congested states, $d\theta^{ik} < 0$. Thus, changes in state taxes that increase factor returns and reduce commodity prices for lower income households and households in more congested states will be favored by the distribution effect.

Term (3) *The Congestion Effect*: Increases in one state's tax may drive businesses and households from that state to other states. The state that loses businesses and residents may now have less crowded streets, less polluted air, and easier access to public facilities. Those citizens who remain are better off. Residents of the states that receive migrant firms and households will experience increased congestion, and suffer a decline in welfare. In state k ,

$$\partial C^k / \partial \tau_{jl} = \sum_i n^{ik} \omega^i (\partial V^{ik} / \partial c^k) (\partial c^k / \partial \tau_{jl}),$$

where C^k is total congestion.

Term (4) *The Indirect Revenue Effect*: Increases in a state tax rate alter private sector consumption and factor use. These changes, when multiplied by existing tax rates, mean an additional, but indirect, change in public revenues. The social value of an extra dollar of public revenues, μ , is then multiplied by this indirect change in revenues to define the net effect on social welfare. The indirect effect on tax revenues in state k is

$$\partial T^k / \partial \tau_{jl} = \sum_k \left[\sum_f (\partial x_{fk}^{**} / \partial \tau_{jl}) \cdot t_{fk} + \sum_r (\partial y_{rk}^{**} / \partial \tau_{jl}) \cdot s_{rk} \right].$$

Term (5) *The Indirect Public Cost Effect*: As factor prices change with changes in state tax rates, governments must pay the new factor prices. These factor price changes provide a windfall gain (if costs fall) or a windfall loss (if costs rise), which is evaluated at the social value of a public dollar, μ . The indirect effect on public sector costs in state k (R^k) is

$$\partial R^k / \partial \tau_{jl} = \sum_k \left[\sum_f (\partial w_{fk} / \partial \tau_{jl}) \cdot b_{fk} \right].$$

Term (6) *The Terms of Trade Effect*: State tax rates may alter aggregate pre-tax incomes earned in communities, when rates change pre-tax prices on goods sold by firms and pre-tax prices on factors hired. These aggregate income changes are evaluated at the average social marginal utility of private income, θ . However, when aggregated over all private firms in this competitive economy this term must equal zero, as firms earn zero excess profits before and after tax rate changes. What remains in the competitive

economy is a terms of trade effect for the exogenous public factors employed in producing public services:

$$\partial \Pi^k / \partial \tau_{jl} = \theta \sum_k \left[\sum_f (\partial w_{fk} / \partial \tau_{jl}) \cdot b_{fk} \right].$$

Against this standard of a fully planned federalist economy stands the actual performance of the decentralized federalist public economy. In this economy, households and factors are mobile across jurisdictions, and state governments are allowed to set their own tax rates, constrained only by the requirements that states balance their budgets and satisfy the re-election demands of local constituents. The budget constraint for a typical state l requires that

$$\sum_f x_{fl}^{**} \cdot t_{fl} + \sum_j y_{jl}^{**} \cdot s_{jl} - \sum_f b_{fl} \cdot w_{fl} \equiv 0. \tag{3}$$

State politics demands that the state l 's political objective function be maximized:

$$\mathcal{P}^l = \sum_i \rho^{il} n^{il} V^{il} \{ q_{**}, w_{**}, c^l(q_{**}, w_{**}); E^{il}, b_{.l} \}, \tag{4}$$

where ρ^{il} is the political weight for group i in state l 's politics.⁶ In the simplest case of median voter politics, $\rho^{il} \equiv 1$ for the median voter and all other political weights are zero. More complicated coalition politics may involve several non-zero values of ρ^{il} ; see Hettich and Winer (1988).

Maximizing the political objective function \mathcal{P}^l subject to state l 's budget constraint defines state l 's preferred tax rates. The state is only allowed to optimize over its own tax rates, however: $\tau_{jl} = s_{jl}$ for taxes on factors employed in state l and $\tau_{jl} = t_{jl}$ for goods consumed in state l . In Gordon (1983, p. 577) each state is assumed myopic when setting its preferred tax rates, taking as given all other states' tax rates and ignoring the effects of its own tax policies on the relocation of people across jurisdictions.⁷ We assume that an equilibrium in this competitive federalist economy exists; see Mintz

⁶ Gordon (1983, p. 577) assumes all states weight each household type identically in the state objective function – that is, $\rho^{il} = \rho^i$ across all l . As Gordon acknowledges, such an assumption removes variation in local politics from consideration in federalist policy.

⁷ Gordon does allow for mobile households and the equal utility constraint when solving the central planner's problem (see Gordon, 1983, appendix), but he ignores the constraint when solving the decentralized game of inter-jurisdictional fiscal competition. Introducing this constraint into a model of inter-jurisdictional fiscal competition can have significant consequences for the conclusions; see Krelove (1992b) and Myers (1990) and the discussion below in sub-section 2.4.

and Tulkens (1986) and Kanbur and Keen (1993).⁸ If so, the first-order conditions of Table 1 for the decentralized competitive economy define each state's locally preferred tax rates.

In this decentralized economy each individual state's optimizing strategy ignores the allocative consequences of its own tax rate on neighboring states and on residents outside its decisive political coalition ($\rho^{il} \equiv 0$). A comparison of the first-order conditions in Table 1 reveals that this competitive fiscal economy is unlikely to achieve the optimal, centrally planned structure of state tax rates. Tax exportation (Term 1), politically determined distribution policies (Term 2), 'not-in-my-backyard' or NIMBY congestion effects (Term 3), competitive tax spillovers on revenues (Term 4) and public goods costs (Term 5), and 'beggar-thy-neighbor' income effects (Term 6), are all potential sources of tax inefficiency or inequity in decentralized federalist economies.

Term 1 reveals a tax subsidy effect in the decentralized case. Here μ^l is the marginal value of a dollar to the politically decisive coalition in state l while θ^l is the marginal cost of a dollar raised from the members of that decisive coalition. Importantly, the decisive coalition of P residents pays only a fraction $-\left(\sum_{i \in P} n^i y_{jl}^i / y_{jl}^{**}\right)$ for a tax on good j consumed in state l and $\left(\sum_{i \in P} n^i x_{jl}^i / x_{jl}^{**}\right)$ for a tax on factor j employed in state l – of the marginal burdens associated with each dollar of revenues raised. This implicit subsidy from non-residents and the politically disenfranchised to members of the decisive coalition is known as 'tax exporting'. The subsidy is likely to encourage the inefficient over-use of the subsidized tax; see Arnott and Grieson (1981) generally, McLure and Mieszkowski (1983) for an application to natural resource taxation, and Mintz and Tulkens (1996) for an application to capital taxation.

Competitive state taxation may also lead to vertical tax inequities (Term 2). Politics within a state create a regressive bias to local tax structures when factors are mobile. In particular, mobile, upper income households may threaten to exit any state unless local taxes approximate benefit taxation. The threat of exit acts as a constraint on within-state redistribution.

State taxes can also be used to discourage the location of unpleasant congestion activities, where the taxing state ignores the congestion effects of such taxes on the welfare of residents in other states (Term 3). Such 'not-in-my-backyard' or NIMBY taxation can lead to the over-taxation of socially beneficial, but locally noxious activities.

The indirect effects of state l 's taxation can have significant effects on the budgets of other states that state l ignores; compare Terms 4 and Terms 5.

⁸ Wildasin (1988) has shown that competitive outcomes can be different if states compete via public goods provision rather than tax rates. Tax rate competition turns out to be the dominant strategy for competitive states, however; see Wildasin (1991).

Here the welfare benefits of taxation in state l are likely to flow outside the taxing state to non-residents. As state l raises its taxes on goods or factors, consumption and factors in that state may migrate outside the state. This migration raises tax revenues (Term 4) and lowers the costs of buying public sector inputs (Term 5) in the other, recipient states. Capital taxation is the usual example; see Wilson (1986), Wildasin (1989), and Gordon (1992). This positive revenue windfall for the rest of the nation is ignored by the decisive coalition in state l when setting the state's tax policy. Thus, taxes with mobile tax bases will typically be underutilized in competitive federalist economies.⁹

Finally, the terms of trade effects (Term 6) of state taxation can be important. Typically, this means very low tax rates – perhaps even subsidies – for mobile inputs that raise factor returns to the state's decisive coalition and that lower the prices of the goods that the members of the coalition consume. These 'beggar-thy-neighbor' fiscal incentives for valued private inputs are typically socially inefficient; see Oates and Schwab (1988).

One decentralized federalist economy will satisfy the conditions for a socially optimal allocation, however. This is the Tiebout (1956) economy. The Tiebout economy's use of a residential head tax or its equivalent (see Hamilton, 1975) to pay for public facilities ensures that there will be no tax spillovers. Terms 2–6 in Table 1 are zero for this tax. Residential head taxes also prevent cross-community tax exporting. Since households are freely mobile and states are elastically supplied, there can be no within-community tax-exporting. Thus, the direct effects of taxation in the decentralized case (Term 1) no longer involve tax subsidies. Finally, interstate competition for residents ensures that the marginal benefits (μ') of a dollar of revenue must equal its marginal cost (θ') in each state. Otherwise, residents will exit. A competitive Tiebout economy therefore achieves tax efficiency.

2.2. *Are tax inefficiencies and inequities economically important?*

The prospects for tax inefficiencies and inequities in a system of decentralized public finance turn fundamentally upon the mobility of consumption and factors of production across state borders. Are either or both mobile across borders? The empirical evidence says *yes*. Geographic and social

⁹ In this paper, we are concerned with the influence of tax competition on the optimal structure of taxation, and thus hold fixed the level of government spending. Here tax competition leads to too little use of the tax with positive spillovers. Other papers in the tax competition literature – e.g. Zodrow and Mieszkowski (1986) or Wilson (1986) – allow for only one tax, but permit endogenous government spending. In those models, tax competition leads to too little taxation, which translates into too little spending relative to the social optimum. The two class of models are exploring different consequences of the same problem.

impediments to relocation appear to give way, even to modest economic incentives.

Empirical analysis shows that cross-border shopping is common and elastic with respect to even small consumption tax differentials – see, for example, Wales (1968). This sensitivity of consumption with respect to tax rates is likely to increase with the spread of video and mail-order shopping. Further, the evidence both for the United States (Gyourko and Tracy, 1989, and Tretz et al., 1993) and Canada (Day, 1992) makes clear that labor is mobile even across large regions – states and provinces – in response to tax-related changes in local goods prices and real wages. Finally, though the evidence on the sensitivity of capital's mobility in response to tax rates is somewhat less decisive, recent studies with improved measures of tax rates find that capital does relocate to tax-favored locations, both within a given country (see Papke, 1991, and Bartik, 1991, ch. 2, for a survey), and internationally (Baxter and Crucini, 1993).

With mobile consumption and factors, decentralized tax inefficiencies and inequities are possible. Are they economically important? The answer turns crucially on the tax involved.

For consumption taxes, tax exporting (Term 1) is significant. Internationally, OPEC nations have historically earned significant rents from implicitly taxing exported oil; other international cartels have taxed copper and bauxite; see Pindyck (1978). Even when the cartel breaks down, but there are only a few producers, taxing exports can still mean significant fiscal transfers from non-residents to the taxing states; see, for example, Kolstad and Wolak's (1983, 1985) studies of the US market for Western Coal. Tax-exporting of consumption taxes from the politically decisive coalition to the disenfranchised within a city or state also occurs. Studies of state and local government fiscal choice show that the decisive median voter enjoys a transfer from the taxation of the housing stock of other residents leading to increased taxation of housing as the value of the housing stock increase; see Rubinfeld (1987).

In contrast, tax exporting (Term 1) is likely to be less important for factor taxes. When capital and labor owned by non-residents are mobile, it will be very difficult to export capital and labor taxes to non-residents. For evidence that labor taxation induces work relocations in open economies, see Grieson (1980), Inman (1992), and Feldstein and Vaillant (1994). For evidence that capital taxation induces capital mobility in open economies, see Papke (1991) and Feldstein (1994). In the case of capital taxation, there may be some shifting after capital is in place; see Ladd's (1975) study of local residential taxation of commercial–industrial property. In the long run, however, exporting of factor taxation will be limited to locally fixed factors of production such as land and natural resources.

A bias towards regressive tax structures in decentralized public economies

(Term 2) is well documented. To retain mobile middle and upper income households, cities resort to regressive taxes whose burdens fall on the less mobile poor and elderly; see Inman and Rubinfeld (1979) for a review of the US city evidence. Inman (1989) found that large US cities adjusted local tax structures by increasing the locally regressive property tax and reducing the locally proportional sales tax in response to central government efforts in the 1986 Tax Reform Act to make the overall burden of local and state taxation less regressive. Chernick (1992) and Metcalf (1993) studying states' responses to the federal efforts in the 1986 Tax Reform to improve state tax equity also found a return to a regressive bias in state taxation. For further evidence that the large US states are constrained in their efforts to redistribute income across households because of labor mobility, see Feldstein and Vaillant (1994).

'Not-in-my-backyard', or NIMBY, taxation (Term 3) is common in the United States, seen most often as an absolute prohibition (infinite tax) on the location of the noxious activity.¹⁰ Communities that do accept noxious waste activities typically charge processing fees that exceed the long-run average costs of safely handling and storing waste.

Tax spillovers (Terms 4 and 5) and terms-of-trade effects (Term 6) are not likely to be a serious problem for consumption taxes, with one possible exception. When only a few states supply a good (e.g. beach vacations) then a tax on that good may affect the demand for goods (surfboards) and services (mountain vacations) supplied by firms in other states.

Tax spillovers and terms-of-trade effects are important for factor taxes, however. Wassmer (1993) documents the extensive use of tax subsidies in US metropolitan areas. Computable general equilibrium (CGE) tax models for regional economies have shown tax spillovers with factor taxation to be very important. Kimbell and Harrison (1984) and Jones and Whalley (1988, table 7) show for plausible parameterizations of a federalist economy that tax increases on capital in one state or province will lead to an economically significant relocation of capital and subsequent changes in factor and goods prices in the other regions.¹¹ The CGE models of Morgan and Mutti show that such price effects can translate into significant out-of-state revenue effects (Term 4) and significant within-state terms-of-trade income gains (Term 6). In Mutti et al. (1989, tables 3 and 4) a 1% increase in a region's tax on business capital leads to a significant outmigration of regional capital,

¹⁰ See 'Coping in the age of NIMBY', *New York Times*, Sunday, 10 June, 1988, Section 3, p. 1.

¹¹ In Kimbell and Harrison (1984) an increase in the tax rate on the value of capital from 0.05 to 0.20 increases prices throughout the economy from 9% in the taxing state to 4% outside the taxing state. Jones and Whalley (1988) compute the income-equivalent welfare effects on all provinces in Canada of lowering one region's taxes (Ontario); again, the effects are economically significant.

which raises capital tax revenues elsewhere in the US regional economy. In Morgan et al. (1989, table 4) US regions that can unilaterally substitute a lump-sum tax for their existing taxes on the income of mobile labor – rates ranging from 0.034 to 0.056 – and mobile capital – rates ranging from 0.04 to 0.53 – can increase regional residents' incomes by 6–10%.¹² Finally, Helms' (1985) econometric study of state income growth using a sample of 48 US states reaches similar conclusions as the CGE simulations. In Helm's work a 2.33% increase in the property tax used to finance redistributive services reduces state incomes by 1.5% in the long run.

Current empirical evidence lends support to the conclusion that tax exporting, regressivity, NIMBY taxation, tax spillovers, and beggar-thy-neighbor tax competition are each important in decentralized public economies. To correct the resulting tax inefficiencies and inequities, central government fiscal policies may be in order.

2.3. Designing central government policies

Given the potential importance of tax inefficiencies and inequities in decentralized public economies, it is natural to turn to central government policies for remedies. Policies should be designed so that fiscally competitive state governments will internalize all relevant fiscal externalities when selecting state tax rates. Two alternative central government policy strategies are considered here: the regulation of state tax bases¹³ or the use of grants-in-aid as fiscal incentives to alter state tax choices.

(1) *Regulation.* A central government regulatory policy, which requires all state taxes to be resident-based – or destination – taxes, rather than source-

¹² While such tax spillover and terms-of-trade effects are hard to ignore, it should be noted that all CGE estimates were derived in federalist economies with only a few states or regions. Most theoretical models of fiscal competition suggest that the magnitude of spillovers in individual states declines as the number of competing states increases. When many states absorb the exit of consumption or factors from the taxing state, the effects on each of the absorbing economies will tend to zero. It would be instructive to know how sensitive the CGE results of significant spillovers are to increasing the number of competing states.

¹³ An alternative 'tax harmonization' strategy, not considered here, is to regulate state tax rates at a common rate. Harmonization has been discussed extensively with respect to the European Union. The formal economic analysis of harmonization has been limited to the case of single taxes, however; either commodity taxes in Keen (1987), de Crombrughe and Tulkens (1990), and Kanbur and Keen (1993), or capital taxes in Giovannini (1989). While a regulated increase in tax rates above the competitive outcomes is typically shown to be pareto improving, fully harmonized (or uniform) rates are not preferred; see Giovannini (1989) and Kanbur and Keen (1993). No studies have yet considered the harmonization of individual state tax rates when states have access to several taxes, the general case under review here. We conjecture, however, that in this general case, tax rate harmonization may be attractive when tax spillovers (Term 4) or beggar-thy-neighbor tax competition (Term 6) lead to inefficiently too low rates of taxation on a particular good or factor (e.g. capital).

based – or origin – taxation, moves a significant way towards tax efficiency in decentralized public economies. With resident-based taxation, factors and consumption can only be taxed by the state of residence of the owner or consumer.

With a complete resident-based tax system, the tax inefficiencies from tax exporting in the decentralized competitive economy (Term 1 inefficiencies) are curtailed. Here, the decisive coalition’s share of local taxation becomes

$$\left(\sum_l \sum_{i \in P} n^{il} y_{jl}^{il} / y_j^{*l} \right)$$

for a tax on good j consumed everywhere by the residents of state l , and

$$\left(\sum_l \sum_{i \in P} n^{il} x_{jl}^{il} / x_j^{*l} \right)$$

for a tax on factor j employed everywhere by the residents of state l , where y_j^{*l} and x_j^{*l} (aggregate consumption (employment) of the j th good (factor) in all (*) states by all (*) residents in the l th state) is the state’s aggregate tax base with complete resident-based taxes. Resident-based taxation removes the implicit tax subsidy from non-residents. Further, in the case where all residents of state l are part of the decisive political coalition, then

$$\sum_l \sum_{i \in P} n^{il} y_{jl}^{il} = \sum_l \sum_i n^{il} y_{jl}^{il} = y_j^{*l},$$

and similarly so for factor taxation. Now all tax exporting is removed. Thus, the subsidized incentive to overuse a state tax – the problem with source-based taxation – is controlled with resident-based taxation. NIMBY tax competition (Term 3 inefficiencies) are also constrained with resident-based taxation; taxing noxious factors of production is precluded unless owned by residents. Further, tax competition (Terms 4 and 5 inefficiencies) or beggarthy-neighbor tax competition (Term 6) are also likely to be curtailed with resident-based taxation since mobile capital, the most likely factor affected by tax competition and/or tax subsidies, is uniformly taxed across locations under the residency principle.

The administration of a complete resident-based tax system may be difficult, however. It requires the central government to trace all out-of-state transactions. For consumption taxes, this requires either full border controls or the honest reporting of out-of-state consumption. This seems likely only for those goods that require registration with the resident’s home state – for example, autos. Taxation of factors of production using resident-based taxes seems more promising, but again, only if the central government can successfully monitor transactions. Tax policies that allow states to ‘piggy-back’ a state-chosen tax rate onto a central government wage or capital income tax are administratively feasible and seem the most promising

approach to resident-based taxation. Piggy-backing on to a national personal income tax is straightforward and currently done by several US states. Giovannini and Hines (1991) outline how such a tax system might work for the more difficult case of capital taxation.¹⁴

What a resident-based tax system does not resolve is the regressive bias (Term 2) of local taxation. Additional regulatory instruments are required. For example, in the United States, requiring the full market value assessment of property would remove regressive assessment bias and be a significant step towards a proportional local property tax; see Inman and Rubinfeld (1979). More generally, the central government could regulate the rate structures as well as the tax base of local taxation. This is most easily accomplished by limiting state and local taxation to 'piggy-backing' on the central tax structure. Here, the state selects a uniform tax rate, which is simply added to the residents' central government tax rate.

(2) *Grants-in-aid*. When resident-based taxation is not administratively or politically feasible – as may well be the case in newly emerging federalist economies – then centrally allocated grants-in-aid may be used to overcome the inefficiencies and inequities of decentralized taxation. For example, the propensity to overuse taxes that permit significant tax exportation (Term 1 inefficiencies) can be controlled by a central government that taxes the exported good at the point of production (a source-based tax) and shares the proceeds via grants-in-aid, which are allocatively neutral; equal lump-sum grants per person across all states is one alternative. If states retain the right to use source-based taxation, then equalizing grants giving more aid to the relatively tax-poor states and 'taxing' (negative aid) the relatively tax-rich states will be needed; see Boadway and Flatters (1982). In effect, such aid formulae centralize source-based taxation.

Tax inequities (Term 2) can also be controlled by grants-in-aid. When the cause of the inequity is a local political basis against low income residents, then a central government grant to governments that penalizes the use of regressive taxes (e.g. consumption taxes on necessities such as housing) and subsidizes the use of progressive taxes (e.g. factor taxes on residents' capital

¹⁴ If a complete resident-based system is too difficult to administer, then a partial resident-based tax might still be considered, in which taxation is based on residents' earnings and consumption only within their home states. In this case, the relevant aggregate tax base is y_{jt}^* and x_{jt}^* (aggregate consumption (employment) of the j th good (factor) in the l th state by all (*) residents in the l th state). Of course, there will be strong incentives to shelter income and consumption by working, investing, and living outside one's state of legal residence. A partial residence-based tax system will solve the problem of tax exportation, but it is likely to significantly constrain the ability of small states, or states with limited natural economic advantages, to raise revenues. If legal residents can still use state services – e.g. free public schools or universities for their children – then a budget imbalance may result.

income) might be favored. Such incentives were included as part of the US General Revenue Sharing Program; see Reischauer (1975).¹⁵

Central government grants policies can also be used to mute the adverse congestion effects (Term 3 inefficiencies) from the relocation of economic activity. Taxes in one state may drive consumers and factors to another, reducing benefits there from common property resources (public facilities, air quality, roadways). The central government can correct this inefficiency either by charging the relocating consumers or factors directly for the congestion they create through a location-specific central government tax, or by taxing the decisive coalition in the original state through a 'negative' grant equal to the aggregate costs of the tax-induced congestion imposed upon its neighboring states;¹⁶ see Wildasin (1985).

To control the adverse effects of tax competition, the revenue and cost-saving fiscal benefits (Term 4 and 5 inefficiencies) created for neighboring states from a state's taxation of mobile consumption and factors should be rewarded by central government grants-in-aid. This can be done through the imposition of a source-based central government tax on the mobile good or factor, which in turn finances a locationally neutral grants-in-aid; see Wildasin (1989) and, more generally, Krelove (1992a). Rivlin (1992, ch. 8) gives such policies a central place in her plan to revive the fiscal role of US states.

Finally, state tax policies designed to enhance local private incomes (Term 6 inefficiencies) through beggar-thy-neighbor fiscal incentives for factor and consumption relocations are likely to lead to state tax rates that are inefficiently too low relative to the planned tax allocation. Low state taxes on capital and on tourist and convention centers are two examples. As with tax competition, the grants solution is for the central government to tax the 'attractive' factor or good at its source and to then redistribute the proceeds in a locationally neutral fashion to the states.

Both the regulation of the tax base and the payment of grants-in-aid can be used by the central government to correct the tax inefficiencies and inequities in decentralized federalist economies. From an economic perspec-

¹⁵ The current US federal tax code provides a subsidy to state taxation of housing and income; the Tax Reform Act of 1986 recently dropped its subsidy of sales taxation. The rate of subsidy is the taxpayer's federal income tax rate and is limited to only those who itemize their deductions; typically, middle and upper income households. By the arguments here, middle and upper income households are the appropriate target group, for they constitute the likely decisive coalition in state politics. Because of the likely regressive bias when localities assess property for taxation, tax equity requires that the subsidy should be limited to just income taxation, however.

¹⁶ See, for example, 'Grants stir interest in nuclear waste site', *New York Times*, Thursday, 9 January 1992, p. A10.

tive, the choice of one strategy over the other ultimately turns on the transactions costs of administering the policies. The regulatory strategy of resident-based taxation requires the central government to trace economic transactions to individual taxpayers. This will require a developed system of personal income and consumption records by the central government. Less expensive perhaps – particularly so for developing economies – would be the administration of grants-in-aid strategies. The grants strategy requires centrally collected source-based taxes on firms and then grants payments to state and local governments. In developing countries, accounting records may be more complete and enforcement problems less severe for firms and governments than for households.

2.4. *Are central government policies really needed?*

Recent papers by Krellove (1992b) and Myers (1990) (hereafter KM) raise a provocative challenge to the prevailing view articulated above that central government intervention is required to achieve tax efficiency in decentralized federalist economies.¹⁷ In a decentralized public goods economy with competing regions, each with access to a non-resident tax base, an efficient tax (and expenditure) policy will result *if* each region's government: (i) is allowed to use a tax on land rents (or rents from another fixed factor), (ii) sets those tax rates to maximize residents' welfare, and (iii) explicitly recognizes that resident welfare must equal that offered to the resident in competitive, neighboring regions. In this federalist economy, no central government policy intervention is needed.

How does the federalist economy in KM differ from that in Gordon? Three assumptions are crucial. First, in the KM economy all households have identical preferences and endowments. Gordon allows for household preferences and endowments to differ. Second, local taxes in the KM economy are limited to head taxes (the resident-based tax) and taxes on rents (the source-based tax), which are assumed sufficient to pay for public

¹⁷ Krellove's and Myers' papers are addressing the same substantive issue of designing financing systems for local public goods when labor is mobile between competing localities. Krellove's analysis describes the problem as one of 'tax exporting', where a portion of a region's tax falls upon non-resident landowners, while Myers' describes the same problem as one of 'fiscal externalities'. Krellove's shows that under appropriate assumptions (see above) 'tax exporting' is not a problem at all; in fact, tax exporting is necessary for fiscal efficiency. Using the same assumptions, Myers shows that locally chosen intergovernmental transfers financed by local taxes will also achieve the efficient financing of local public goods. A comparison of Myers' locally financed grants and Krellove's taxation of non-residents reveals that the two policy instruments are identical. Thus, while the two papers seem to be addressing two separate problems, they in fact address the same question with the same model and the same policy instrument. They reach the same important, and provocative, conclusion: under conditions (i)–(iii) listed below, central governments are not needed for efficient local finance.

goods expenditures. In contrast, Gordon also allows for taxes on goods with elastic demands and on factors with elastic supplies. Third, and most crucially, KM's local governments explicitly recognize that mobile residents in their locality cannot be made better off than residents in other communities through local fiscal policy. Gordon's local governments, however, behave myopically and assume local residents' welfare can be improved at their neighbors' expense.

Were the KM model to simply assume identical households and to limit taxation to local head taxes we would be in a Tiebout public goods economy. Taxation, public goods provision, and the economic location of factors of production would be efficient and (by assumption) fair. Problems arise, however, because KM allow their local governments to use a tax on rents of a fixed factor and the rent-earning assets are owned in part by non-residents. The source-based taxation of rents leads to tax-exporting and thus a potential incentive to overuse this tax – what we have called Term 1 inefficiencies.¹⁸

KM's key additional assumption that local governments explicitly consider the effects of their fiscal decisions on relative household welfare across localities solves, perhaps surprisingly, the problem of Term 1 inefficiencies. When localities explicitly consider the effects of their fiscal decisions on relative household welfare, they introduce an additional constraint into their local decision to tax; namely, that household utilities are equalized across all citizens in all communities, or, more formally, that $V^{*l} = V^{*k}$ for the identical households in localities l and k . Intuitively, to see why the equal utility constraint removes Term 1 inefficiencies, note that a \$1 increase in rental taxation to fund public goods in community l initially costs residents an amount equal to their share of the ownership of the fixed factor – n^l/N in the simple case. They receive a tax-exporting subsidy of $1 - (n^l/N)$ dollars, which increases their utility by $[1 - (n^l/N)]\alpha$, where α is the private marginal utility of income. The equal utility constraint, however, cannot let this small advantage stand for the citizens in community l . The government in community l takes this fact into account when setting taxes on rents. Entry of new workers will bid down wages in l until the utility of residents in l falls by exactly $[1 - (n^l/N)]\alpha$; that is, until wages fall by the amount of the tax-exporting subsidy of $[1 - (n^l/N)]$. The true marginal cost of raising this last \$1 of rental taxation to the residents of community l is therefore n^l/N in

¹⁸ Note that by assuming identical households, the KM model rules out Term 2 inequities. The only mobile factor of production is labor and, since all market goods are free of externalities and all government goods are purely public, labor imposes no congestion costs when it relocates; thus, there can be no Term 3 inefficiencies. Finally, KM rule out taxes on the income of the mobile factors of production or on consumption; thus, there can be no Terms 4, 5, or 6 inefficiencies. Tax exporting is, therefore, the only inefficiency at issue in the KM model.

direct tax costs plus $[1 - (n^l/N)]$ in reduced wages or \$1 – and local governments know this! There is no incorrectly perceived tax-exporting to non-residents, and thus the efficient level of rental taxation obtains.¹⁹ This is a striking conclusion, particularly in light of the discussion in Section 3 that central governments may themselves be inefficient when attempting to correct the failures of the local public economy.

We need to assess how close real federalist economies come to meeting the assumptions of the KM economy. Certainly, allowing local governments to consider the equilibrium effects of household relocations on resident welfare seems a reasonable extension of the Gordon model of local fiscal behavior, though one should test the empirical validity of this assumption against the alternative hypothesis of myopic local jurisdictions. If local politicians have short planning horizons, much depends on how quickly outsiders relocate into tax-exporting jurisdictions. More troubling is the restriction in the KM model to consider only identical households. Limiting the analysis to a single representative agent does more than just rule out (Term 2) tax inequities. It also means that when each local government considers the equal utility constraint ($V^{*l} = V^{*k}$), it does so for only one, politically decisive, type of resident. But if there are multiple types as in the Gordon economy, one community might consider only the welfare of residents of type $i = 1$, while another community considers only the welfare of residents of type $i = 2$, etc. The KM equilibrium will not, in general, be efficient in this case. Only if local governments (politically) weigh all consumer types identically when making local fiscal choices ($\rho^{il} = \rho^{ik}$ for all l and k) will the KM conclusion remain; Krelove (1992b, p. 154). This seems unlikely. Finally, important to the KM conclusion is their assumption limiting local taxation to head taxes and rental taxes. In public goods economies, where all important factors of production including land are in elastic supply, there will be no rents to tax. Without rental taxation, head taxes must fully finance local public goods. This is, of course, the Tiebout economy. If head taxes prove infeasible, the burden of financing local public goods must then fall on consumption and factor taxes. This is Gordon's

¹⁹ See Krelove (1992b). Rather than the local labor market, Myers (1990) uses inter-governmental transfers to ensure efficient use of local taxation of the economy-wide asset. Intuitively, the taxing jurisdiction realizes that residents outside the jurisdiction will move into the area and depress wages unless they receive a transfer sufficient to discourage their entry. This will require a transfer of $[1 - (n^l/N)]$ dollars, the advantage of relocation. Residents inside the taxing jurisdiction raise the $[1 - (n^l/N)]$ through the local head tax. In the end, \$1 of rental taxation costs the residents of the taxing jurisdiction n^l/N in rental tax costs plus $[1 - (n^l/N)]$ in head taxes to pay for the inter-governmental grant or a total of \$1. Again, inefficient tax exporting is avoided.

economy, and local tax inefficiencies and inequities return; see Burbidge and Myers (1994).

While an important caveat to the need for policy interventions into the local public economy, the Krelove and Myers economy is not sufficiently general for us to put the potential need for central government fiscal regulations and grants aside.

3. The political economy of implementing central policies

While regulatory or fiscal policy instruments are available to the central government to correct the failures of decentralized taxation, there remains the political issue of whether the central government itself will select socially preferred policies. In federalist economies, central government legislatures are typically composed of representatives elected from the federation's states or provinces with a mandate to represent the preferences and concerns of their state constituents. Central government policies result when a majority of the elected representatives approve a policy.

Before any policy decisions are made, however, the elected legislature must resolve majority-rule democracy's major defect: the propensity to cycle from one policy outcome to another. When no winning coalition is capable of holding its majority against small policy variations offered by a losing minority, then either no decision will be made or final policy outcomes will be randomly chosen or manipulated by an agenda-setter. Legislatures have adopted a variety of procedures for overcoming this instability and its consequences, from formal rules of who can offer proposals to informal norms of voting behavior.

One model of legislative choice specifies an informal norm for legislators' voting to control cycling.²⁰ The norm, first specified formally by Weingast (1979) and Niou and Ordeshook (1985), is a norm of deference. Under this norm, individual legislators or coalitions are allowed to propose their preferred policies. Those policies will be approved, *if* that legislator or coalition approves, or defers to, similar proposals by all other members of the legislature. This norm – popularly characterized as, 'You scratch my back, and I'll scratch yours' – typically leads to proposals receiving universal

²⁰ While there is growing evidence that the model presented here is a good description of legislative decision-making in the US Congress – see Weingast and Marshall (1988) – it is certainly not the only model of legislative politics that overcomes cycling. Shepsle (1979) and Baron and Ferejohn (1989) have presented alternative models using formal legislative rules to ensure stable policy outcomes. Becker (1983) and Wittman (1989) present a model of legislative choice based on Coasian bargains between represented interest groups.

support.²¹ Such legislatures are often called ‘universalistic’ for this reason.²² Once adapted, the norm is a stable Nash equilibrium; no member of the legislature has an incentive to deviate if all others adhere to the norm.

Universalistic legislatures operating under a norm of deference run a significant risk that the resulting fiscal policies will be economically inefficient, however. Central government funding of state-specific expenditures creates an implicit subsidy from non-residents to residents of the state receiving the centrally funded expenditure. Residents in the recipient state have an incentive to over-spend on the now centrally subsidized service. Adherence to the norm of deference protects these inefficiencies.

Fig. 1 illustrates the allocative consequences of central government funding of state-specific spending as, for example, might occur with central government grants to correct state tax inefficiencies and inequities. The downward sloping $mb_k(g^k)$ schedule measures the marginal benefit to the winning political – perhaps median – coalition in state k of a state-specific expenditure of g^k . The downward sloping $MB(g^k)$ schedule measures the aggregate social marginal benefits in improved tax efficiency or equity from the grant of g^k . The horizontal curve $p_k(g^k)$ measures the marginal social costs of providing the grant of size g^k , while the lower curve $\phi_k p_k(g^k)$ measures the share (ϕ_k) of those costs borne by the winning coalition in state k . In the very simple case where all state residents are in the decisive coalition and each state has an equal share of the national tax base, $\phi_k = 1/K$, where K is the number of states in the federation. If the decisive coalition is smaller than the state’s full population, then $\phi_k < 1/K$. Typically, ϕ_k is small and the decisive coalition pays only a fraction of the total costs of central government expenditures allocated to their state.

Social efficiency requires $MB(g^k) = p_k(g^k)$, or the allocation g^{ke} . However, a legislature operating under a norm of deference will provide g^{ku} in each state, where $mb_k(g^k) = \phi_k p_k(g^k)$. The efficiency of these allocations

²¹ The intuition of why the norm of deference is individually preferred to simple majority-rule legislatures is straightforward. Without the norm, each legislator can expect his state to pay for a little more than half of the legislature’s average project, since all states share in the costs of each legislator’s project and one more than half of all the states receive projects. Further, each legislator can expect his state to be given a project, on average, a little more than half the time. Thus, expected net benefits from simple majority rule will be a little more than $0.5 \times [\text{State project benefits} - \text{Average project costs}]$. When the legislature operates under a norm of deference and all projects are accepted with certainty, then expected net benefits will be simply $[\text{State project benefits} - \text{Average project costs}]$. If state benefits exceed average project costs, then the norm of deference will be preferred; see Weingast (1979).

²² For some evidence that the US Congress is, in fact, universalistic, see Collie (1988). There are now growing indications that the voting for representatives to the newly empowered European Parliament is also being driven by local, rather than Union-wide, economic concerns; see ‘European issues are few as Europe votes’, *International Herald Tribune*, 10 June 1994, p. 1.

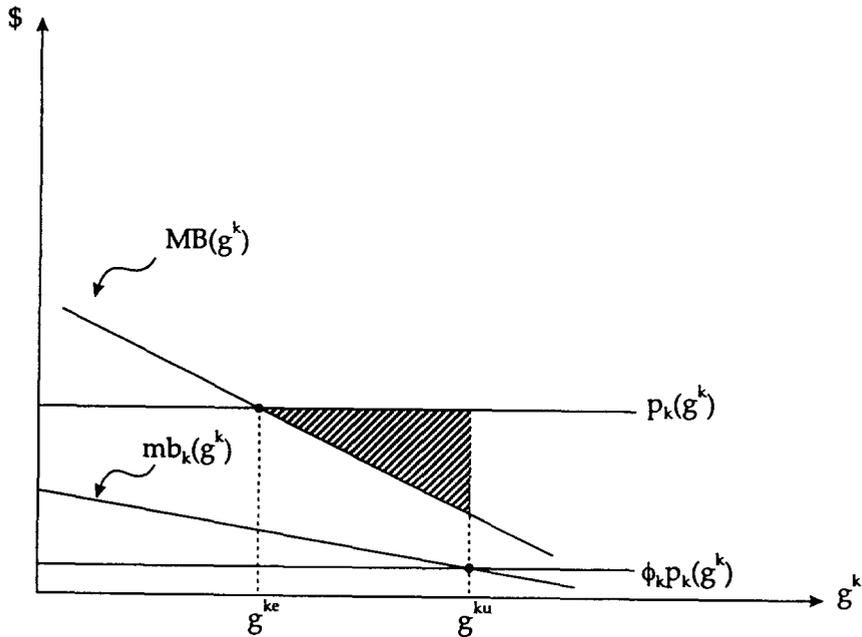


Fig. 1. State allocations from universalistic legislatures.

depends upon the distribution of citizen demands relative to the distribution of tax burdens. Since the decisive coalition's share of state benefits from g^k spending is likely to be much larger than their share of the national cost of funding g^k , an over-provision of a state-specific good seems the most likely outcome – that is, $g^{ku} > g^{ke}$ as shown in Fig. 1.²³ The shaded area in Fig. 1 measures the inefficiency in the provision of g^k when that good is over-provided.

Inman (1988) provides evidence that this has, in fact, been the outcome of US grants policies. In an econometric analysis of US grants policies over the

²³ Define the relationship between the social marginal benefit and the decisive coalition's marginal benefit by the proportional relationship: $\Psi_k MB(g^k) \equiv mb_k(g^k)$. Note that $\Psi_k MB(g^k) \equiv mb_k(g^k)$ by construction, and $mb_k(g^k) = \phi_k p_k(g^k)$ by the political process. Thus, $\Psi_k MB(g^k) \equiv mb_k(g^k) = \phi_k p_k(g^k)$ or $(\Psi_k / \phi_k) MB(g^k) = p_k(g^k)$. The demand share parameter for the decisive coalition, Ψ_k , is defined by the distribution of citizens' demands for the state expenditure (grant), while the cost share parameter for the decisive coalition, ϕ_k , is defined by central government's tax rates and the distribution of the tax base. Public goods are over-provided ($MB(g^k) < p_k(g^k)$), efficiently provided ($MB(g^k) = p_k(g^k)$), or under-provided ($MB(g^k) > p_k(g^k)$) as $(\Psi_k / \phi_k) > 1$, $= 1$, or < 1 – that is, as the decisive coalition's share (Ψ_k) of national benefits exceeds, equals, or is less than their share (ϕ_k) of national costs. The likely case – shown in Fig. 1 – is for the decisive coalition's share of benefits to exceed their share of costs when state-specific spending is financed by national taxation.

past thirty years, Inman finds that the structure of direct US grants to states does little to control tax spillovers on the margin, nor does it provide appreciably greater assistance to low income or resource-poor states. Further, national subsidies have not typically provided tax relief from local source-based state taxation. Grants revenues are spent either on state public goods or provide relief for resident-based taxes. Finally, Inman's econometric estimates of US grants spending under the assumption of a universalistic central legislature predicts values of $g^{ke} = \$120$ per capita and $g^{ku} = \$179$ per capita for a typical US state; see Fig. 1. The shaded area of inefficiency is estimated to equal \$18 per capita or approximately \$0.10 for each dollar of aid distributed.²⁴

Might central government regulation of source-based state taxation fare better? If central government legislatures operate under a norm of deference, there are good reasons to be skeptical. Citizens in individual states benefit when their states are allowed access to the tax base of non-residents through source-based taxation. Just as individual states push to inefficiently expand state-specific grants from the national tax base, so, too, might they seek to expand source-based taxation so as to maximize transfers from non-residents. Under a norm of deference, states that benefit from source-based taxation (e.g. mineral-rich states) will ask, and be given, the right to use such taxes. The decision to grant source-based taxes is identical to the decision to offer any other nationally-financed, state-specific public good. Fig. 1 therefore applies, and inefficiencies, namely a move to source-based taxation, can result. It is instructive that each of the three prominent federalist democracies – Australia, Canada, and the United States – allow states access to source-based taxation.

We conclude that central governments run by universalistic legislatures are not likely to manage efficiently the tax failures that arise within a decentralized federalist public economy. In these legislatures, the same economic incentives that lead states to adopt inefficient tax policies in the decentralized public economy may well lead their elected representatives to adopt inefficient central government policies to correct those tax failings. What can be done?

Two strategies are available, one legislative and the other constitutional. The legislative strategy is to replace the norm of deference with an alternative decision-making structure less susceptible to local interests when

²⁴ Wildasin (1989) provides a more encouraging view of one aspect of the US grants program for state taxation. He estimates that the efficient rate of subsidy for capital taxation when capital is mobile ranges from 0.17 to 0.40 depending on the degree of capital mobility. US firms are allowed to deduct state taxes when calculating their taxable income for federal corporate taxation. The current tax rate on corporate income is 0.34. Deductible state taxes on capital income are, therefore, subsidized at a marginal rate of 0.34, within Wildasin's range of efficient capital tax subsidies.

setting national policies. Strong political parties with the ability to replace legislators who do not conform to party positions is one alternative. Such parties may internalize the tax costs of public spending to all party members, not just to the legislators from the one state or province receiving the allocation. This raises the relevant tax share in Fig. 1 to a 'party' tax share $\phi_p > \phi_k$. The likely consequence is a decline in inefficient over-spending on localized goods; Inman's (1988) study of US grants policy estimates that strong political parties (evident through the late 1960s) would have reduced grants spending by 24% from the universalistic level of \$179 per capita found in the late 1970s.²⁵ A second legislative strategy is to strengthen the hand of a nationally elected executive – for example, giving that executive veto powers over inefficient grants. Inman's (1988) analysis of US grants policy shows that President Reagan's use of the executive veto threat was successful in trimming inefficient national grants to state and local governments by 15–22% in real terms over the 1980s.²⁶

Two constitutional strategies are also available to constrain central government tendencies to adopt inefficient policies towards lower-tier tax financing. The first, and most promising, is to constitutionally assign only resident-based taxation to the lower tiers of government, allocating all source-based taxation to the central government. The most likely assigned tax is a resident-based income tax, administered centrally through locally decided rates 'piggy-backed' on to the national income tax. To the extent that resident-based taxation does not fully ensure local tax efficiency or fairness, central government grants remain a useful policy tool. The risk of inefficient grants design and local over-spending within universalistic central legislatures also remains, however. The propensity to over-spend within universalistic legislatures can be constrained by a second constitutional strategy: limiting the number of states in the federalist hierarchy. Fewer

²⁵ A decline in grants spending is clearly the outcome when the grant benefits only the resident of the recipient state. However, strong political parties may be able to redesign local grants so that they achieve their true social objectives of controlling tax exporting and internalizing tax spillovers. If so, then the decisive national party's marginal benefit curve from spending on g^k lies above the local marginal benefit curve – $mb_p(g^k) > mb_k(g^k)$ – reflecting the wider social benefits of the redesigned grant to state k . While tax costs of grants spending in state k are higher as $\phi_p > \phi_k$, so, too, is the marginal benefit curve as $mb_p(g^k) > mb_k(g^k)$. With efficiently designed grants, grants spending in state k may actually increase. The important point, however, is that this added grants spending is for targeted grants affecting wider social goals, not just per capita transfers to state k . Economic efficiency is improved thereby.

²⁶ The newly adopted South African Constitution allows for both strategies, first by requiring proportional representation to the national parliament from a national election for parties, and then by giving the President control over a Financial and Fiscal Commission with powers to review all national grants policies. It remains to be seen whether strong political parties and a strong Financial and Fiscal Commission will actually emerge to control domestic grants spending.

states may lead to more inclusive tax shares – ϕ_k rises – that reduce g^{ku} in Fig. 1. Limiting the number of states also leads to fewer constituent districts claiming inefficient grants from the central government.²⁷

4. Fiscal institutions and fiscal efficiency in federalist economies

Our theoretical understanding of competitive tax policies and the growing empirical evidence strongly suggest that at least for local government source-based taxation, fiscal inefficiencies and inequities are likely in federalist public economies. Tax exportation, competitive tax spillovers, and NIMBY and beggar-thy-neighbor tax competition may each lead to an inefficient mix of state taxes. Within-state politics when tax bases are mobile may lead to tax inequities. After identifying the problems, current tax theory also suggests possible solutions.

Requiring states to use only resident-based taxation goes a long way towards solving the problems of tax exportation and tax competition. Central government taxation of natural resources and mobile capital at source coupled with locationally neutral grants-in-aid is an alternative policy option to limit the inefficiencies from tax exportation, tax spillovers, and tax competition. Such grants can also be designed to correct within-state tax inequities and to control congestion, or NIMBY, tax inefficiencies.

While policies exist that can correct the potential inefficiencies and inequities of a decentralized tax system, those policies must be approved by a central government. In one political economy model of central government policy-making – a model that seems to describe US congressional behavior – political approval of efficient central government reforms seems unlikely. In representative universalistic legislatures, the same economic incentives that leads states to export their local tax burdens lead them to retain source-based taxation and to over-use a central government grants policy.

This review stresses the importance both of informal, less permanent, legislative structures and formal, more permanent, constitutional constraints to improve the central government's allocation of federalist tax policies. Decentralized legislatures controlled by local political interests will not

²⁷ There are costs to fewer states in the federalist structure, however. Fewer states means greater heterogeneity of demands for state-specific public goods financed by state taxes. This may lead to within-state inefficiencies in the provision of state-specific public goods; see Rubinfeld (1987). We have abstracted from this issue here by fixing the level of public goods spending within each state. A more general specification of the constitutional design in federalist economies would balance the gains of increased national efficiency on the financing side against the costs of increased within-state inefficiencies on the spending side; see Inman and Rubinfeld (1996).

approve central government policies capable of constraining those local interests. Strong political parties and strong executives elected by a national constituency are needed if national interests in efficient federalist tax policies are to result. Constitutional constraints also have a role to play. Most promising is to assign resident-based taxation as the only constitutionally allowed state and local tax. State and local governments would be permitted to 'piggy-back' a local rate on to a nationally administered tax such as personal income tax. Source-based taxation would be limited to the central government. A cruder, but potentially still useful, constitutional constraint is to limit the number of states or provinces in the Union. Fewer states mitigates against the potential inefficiencies of representative universalistic legislatures; of course, fewer states may also mean state fiscal policies that are less responsive to the heterogeneity of citizen demands for local public goods.

An obvious but not generally acknowledged lesson emerges from this review: good tax policy in a federalist public economy will require local and central political institutions capable of first approving, and then maintaining, such policies. Recent theoretical and empirical research on the effects of taxes in decentralized economies provides the guidelines needed to fashion an efficient and fair federalist tax structure. A deeper understanding of exactly how governments set fiscal policy in federalist economies – at both the state and central levels – seems an important next step in our research agenda. Only with this understanding can we be confident that good economic advice will become good economic policy.

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